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CROP TALK

OMAFRA Field Crop Specialists—Your Crop Info Source

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Nitrogen Source for Wheat Urea, 28%, Sulphur?

by Peter Johnson, Provincial Cereal Specialist, OMAFRA

It's TIME to get fired up about putting nitrogen on your wheat! But what source is best? There has been lots of discussion lately around urea and 28%, and more recently sulphur has joined the fray. So what is the real scoop?

Streamer Nozzles

Unlike most of the literature, Ontario field plot data shows a yield benefit to 28% over urea (Table 1). The main difference between Ontario trials and other jurisdictions is the fact that all our trials used streamer nozzles, not floodjet nozzles. Lesson #1 - If you don't use streamer nozzles with 28%, don't use 28%!

Uniform Application

There is no good reason that 28% should outperform urea, but often it does. Our only explanation is that 28% has perfect uniformity across the sprayer boom. Miss a one foot strip, and you will see it all year! Applicators spreading urea often have difficulty in achieving perfect uniformity of distribution. Urea is less expensive than 28%. Still, Table 2 suggests that on average an $8.00/acre advantage remains for 28%, despite lower cost of urea. Lesson #2 - If you are using urea, either "double spread" with a spinner spreader (20 foot centres with a 40 foot spread, at half the rate), or be sure the airflow is working perfectly.

Cropline 1-888-449-0937

Ontario Ministry of Agriculture, Food & Rural Affairs, Crop Technology Branch

Agricultural Information Contact Centre: 1-877-424-1300
Publication Order Centre: 1-888-466-2372
Northern Ontario Regional Office: 1-800-461-6132
OMAFRA Web Site: http://www.omafra.gov.on.ca//english/crops/index.html

Sulphur
Free sulphur from air pollution (acid rain) is declining as efforts to reduce pollution are successful. At some point we will likely need to add sulphur to our wheat crop, as they did back in the late 1800's and early 1900's. However, sulphur additions from pollution should still be enough to meet wheat requirements, although canola and alfalfa may run short. Sulphur must be applied in the sulphate form to be available to the crop - ammonium sulphate, potassium sulphate, or ammonium thiosulphate. We simply do not know if sulphur on wheat will pay yet.

LESSON #3 - Do a plot with us! We are starting a three year sulphur trial, and have one year left in our 28% versus urea trial. Trials are simple to do. Contact Wheat's Wild Warrior through the ***CROPLINE*** at 1-888-449-0937, if you are remotely interested in helping figure out the answer. Just DO IT!

Table 1 and 2 summarize yield and economic results of the first two years of the 28% vs Urea Trial being conducted through Middlesex Soil and Crop.

Table 1 - Wheat Yields - 28% vs Urea

Year	Urea vs. 28%					
	No. Sites	28%		Urea		% Wins
		bu/ac	t/ha	bu/ac	t/ha	
2004	8	88.7	5.96	84.8	5.70	88
2005	11	85.8	5.77	83.4	5.61	73
Average	19	**87.3**	5.87	**84.1**	5.65	79

Table 2 - Economic Analysis of 28% vs Urea

		$ Gross Value Per Acre Less Cost of Nitrogen	
	No. sites	28%	Urea
2004	8	$269.05	$258.10
2005	11	$258.90	$253.20
Average	19	$264.15	$255.65

Manure Nitrogen for Wheat?

by Christine Brown, Nutrient Management Lead and Peter Johnson, Cereals Specialist, OMAFRA

Can we do it? Many farmers that have manure are looking for any profitable opportunity to use this resource. They are constantly on the lookout for another time slot for spreading, another crop to use the manure and turn the nitrogen into dollars. Wheat may provide exactly what these growers are seeking, but there are some **huge** pitfalls to watch out for.

Uniformity of Application
Whenever manure is applied, uniformity of application is PARAMOUNT! Table 1 shows that while manure can replace fertilizer, it does not always equal commercial nitrogen. There is good evidence that most of this difference is due to uneven applications. Table 2 shows significant yield benefit to a combination of both manure and fertilizer for the wheat crop, out yielding fertilizer or manure alone. This is a fascinating result! Some commercial fertilizer should be included to overcome spread variability, but does manure offer some yield enhancement that commercial fertilizer is not able to replace?

Side-by-side comparisons conducted in Southwestern Ontario in 2005 would indicate a benefit from spring applied manure as is shown in tables 1 and 2.

Table 1: 2005 Manure vs Fertilizer - Effects on Yield (bu/ac) of Winter Wheat

	Sites	Manure bu/ac	Fertilizer
	9	82.2	84.8
Broiler	2	98.2	93.8
Hog	6	81.1	85.8
Dairy	1	57.3	60.8

Table 2: 2005 Manure Plus Fertilizer - Effects on Yield (bu/ac) of Winter Wheat

	Sites	Fertilizer bu/ac	Manure + ½ N*
	4	82.1	87.2
Broiler	1	99.5	106.6
Hog	2	84.1	87.6
Dairy	1	60.8	67.1

* half to two-thirds of N requirement as manure N + one-third to half of N requirements from commercial N

Timing of Application

Just as with commercial N applications, timing of manure application is critical! Compaction is a major concern. Application on frost is by far the best option, but the window may be very narrow. Application on dry soil is the other option that works well. We have been surprised at how advanced the wheat can be at time of application, meaning that applications up until May 10th are probably okay with drag hose applications.

Of the plots tried in spring of 2005, manure application on snow has proven most difficult. The more snow on the ground, the more unpredictable the outcome. So application on snow is OUT, nutrient management rules or not!

More Trials Needed!

Needless to say, we don't have all the answers yet! Note that our data is for one year only, and on limited sites. We need more trials to figure out the whole answer. Work with us! If you are planning on trying some manure on wheat this spring, do a plot with us. Leave your contact information on the *CROPLINE* (1 888 449 0937). If manure can actually increase wheat yields by another 5 bushels per acre, we absolutely need to get there!

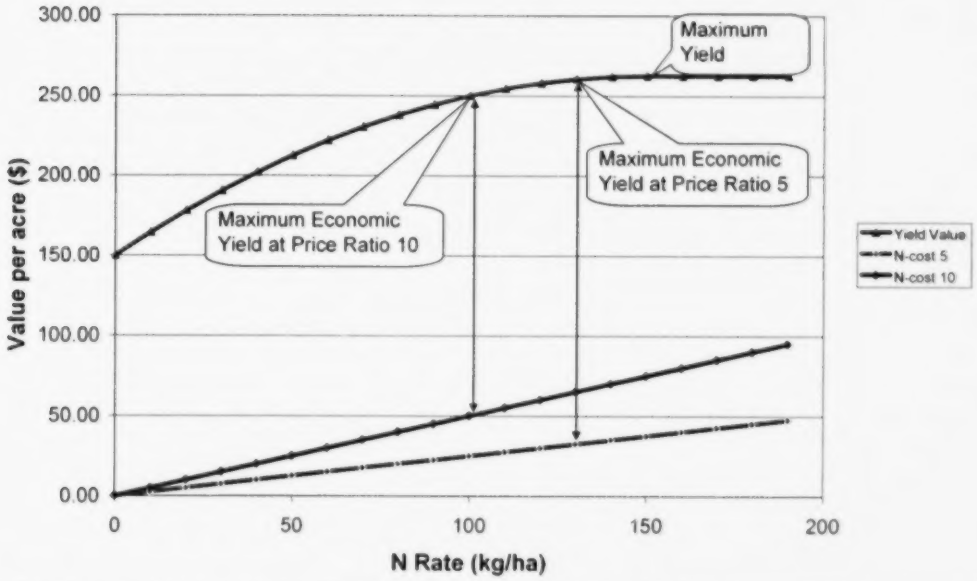
Fertilizer Is Expensive .... How Much Less Should I Use?

by Keith Reid, Soil Fertility Specialist, OMAFRA, Stratford

Fertilizer prices have risen significantly in the past two years, particularly for nitrogen and potash. Nitrogen prices are driven by the price of energy, since natural gas is the main feedstock for ammonia production, and ammonia is the base for all other types of nitrogen fertilizer. Potash prices have been driven by strong world demand, particularly in China and India, so that supply is inadequate to meet the requirements and prices rise. Neither of these prices is expected to come down in the near future.

Compounding the issue of high fertilizer prices are low prices for most commodities. In general, crop response to nutrients follows the "law of diminishing returns". The greatest increase in yield is from the first pound of nutrient added, and each additional pound of that nutrient gives a smaller yield increase. Eventually, a maximum yield is reached, and adding more fertilizer beyond this point doesn't produce any yield increase, and may actually cause yield to decline. This is shown in Figure 1. The Maximum Economic Yield is lower than the maximum yield, occurring where the

Figure 1: Corn Response to N



difference between the cost of the fertilizer and the value of the crop is greatest.

As the cost for fertilizer increases, or the value of the crop declines, the ratio between these two prices increases. Price ratio is simply the number of pounds of grain that it takes to purchase a pound of nutrient. Traditionally, it has taken about five pounds of corn to buy one pound of nitrogen (Price Ratio = 5), but with current prices it is taking about ten pounds of corn to buy a pound of nitrogen (Price Ratio = 10).

The greatest challenge in determining the price ratio is predicting the price of the grain that will actually be sold (or fed). This means anticipating where the markets will be, plus any government stabilization payments, but minus any trucking, drying and marketing costs to give a net price per bushel or pound of grain. For grain that is fed on-farm, the value should be calculated by using the cost of feed to replace any lost yield, so the values used may be higher than the cash grain market.

For nitrogen on corn, each unit of increase in price ratio above 5 would reduce the maximum economic rate of N by 6 pounds per acre. This means that at a price ratio of 10, the optimum nitrogen rate would decrease by about 30 pounds per acre from what is normally applied. The reduction in N requirements is not as great for winter wheat, but we would expect optimum rates of N to be about 15 pounds per acre less than what is usually applied. There is not as much documentation for other cereals, but I would anticipate a similar reduction to wheat would provide maximum return per acre.

Predicting optimum potassium rates is complicated by the fact that potassium is retained in the soil, so yield responses are spread over more than one crop. A soil test remains your best guide to which fields are most likely to give a profitable response to potassium fertilizer.

Glyphosate Additives on Soybeans

by Adam Hayes, Soil Management Specialist-Field Crops, OMAFRA

The acreage of Roundup Ready soybeans has increased significantly over the last number of years. In a number of areas growers have been encouraged to add a foliar fertilizer to glyphosate when making the application. The directors of the St. Clair District Soil and Crop Improvement Association (SCDSCIA) decided to do a project to see if there is a benefit to the addition of the foliar fertilizer.

The project assessed the following three foliar fertilizer additives to glyphosate on soybeans:

- "Oligosol Crop Booster",
- "Alpine Fortified" and
- "UAP Green With Envy.

One litre/ac (2.4 L/ha) of the foliar fertilizer was added to the 1.0 L/ac (2.4 L/ha) rate of glyphosate and applied at the first to third trifoliate growth stage.

Results

Observations of the crop after the application of glyphosate plus the foliar fertilizer from the cooperators showed no visible differences in crop colour or growth. Generally no differences in weed control between the treatments was observed.

The project was only conducted for one year, so that should be taken into consideration when looking at the results. The yields from the main plots and the secondary plots did not show an advantage to the addition of any of the foliar fertilizers (Table 1). The variation in yield of the treated versus untreated was within the range of variability you would expect in these types of plots.

Table 1. Average Yields of the Untreated and the Foliar Fertilizer Treatments

County	Untreated Yield (bu/ac)	Treated Yield (bu/ac)	Difference (bu/ac)
Essex	39.1	39.5 (Crop Booster)	+ 0.4
Kent	44.8	43.7 (Green With Envy)	- 1.1
Lambton	49.0	49.6 (Alpine Fortified)	+ 0.6

Middlesex & Elgin Study

The results are similar to the results of a foliar project that the Middlesex and Elgin Soil and Crop Improvement Associations conducted from 1997-1999. A foliar product with a similar nutrient content was applied to soybeans at different crop stages. The average yield on 33 plots for the

untreated treatments was 48.3 bu/ac, and the treated yield was 47.3 bu/ac giving a difference of negative one bushel per acre. No yield advantage to the foliar fertilizer application.

Not a Targeted Approach
The major source of nutrient uptake for plants is through the roots. Generally, soil and tissue samples are analyzed to determine if sufficient levels of nutrients are present in the soil to grow a crop. Any deficiencies are usually corrected with a fertilizer application to the soil. Micro nutrient deficiencies are usually corrected with soil or foliar fertilizer applications depending on the nutrient and the crop. The approach is a targeted one. This project is not based on a targeted approach. Also the time the nutrients were applied is at a stage when the crop does not have much leaf surface area to take up the nutrients. Although the application timing was better with the Middlesex and Elgin project it did not achieve the desired result either.

The bottom line on the SCDSCIA project is that the product cost of ~$2.50-$5.00 per acre did not return any increased yield. No additional application cost would apply as the product was tank mixed with the glyphosate.

Organic Soybeans

by Hugh Martin, Organic Crop Production Lead, OMAFRA, Guelph

Growers are intrigued by the opportunity to get $18-20 per bushel for their soybeans. Can you do it profitably? I find that under good management, organic soybeans frequently average over 30 bu/ac. Last year, many averaged over 35 bu/ac. Prices are currently $18-20 per bushel for organic food grade. Organic feed grade (such as stained) will price out at $12-15 per bushel. Therefore revenues for organic soybeans can be over $500 per acre for a successful organic soybean crop. This year, Agricorp is offering a new production insurance option for certified organic soybeans.

Organic Seed
The cost of growing organic soybeans will likely be similar to conventional soybeans. Organic seed will be more expensive. Varieties need to be clear hilum, non-GMO as specified by your contract or expected buyer of your organic soybeans. Some buyers require specific varieties for their end market.

Fertility
If soil fertility is good there will be no direct fertilizer costs. On fields that need additional fertility, it is usually applied as composted manure or other permitted supplements. This is applied during other parts of the crop rotation (such as before corn or wheat/spelt) for crops that are more responsive. Herbicide and pesticide costs are eliminated for organic soybeans.

Crop Rotation
Crop rotation is necessary for soybeans and is required by the organic standards and inspectors. Continuous soybeans will always have more weed problems. Cover crops are encouraged throughout the crop rotation so that

- the soil is kept covered as much as possible and
- the soil has a diversity of crops to encourage a diversity of soil microorganisms.

This improves the nutrient cycling, soil organic matter and overall health of the soil.

Tillage & Planting
Conventional tillage practices are used for organic soybeans. Usually the field is worked early in the spring to level the field and warm the soil to encourage the first flush of annual weeds. A second tillage pass two weeks later will destroy these weeds. Soybean planting is usually delayed until late May, when the soil is warm enough to encourage rapid emergence and to allow preplant tillage to kill early weed flushes.

Weed Control
After planting, about two days before crop emergence, the crop will be harrowed (usually with a weeder or tine harrow) or rotary hoed. This will kill germinating weeds, most of which are not yet emerged. A week later, after crop emergence, this will be repeated. The first row-cultivation will be done as soon as is practical without covering the young soybean plants. Most organic soybeans will be row-cultivated a second time before the crop canopy fills in the rows. In some cases, the weeder harrow is used in between row-cultivation passes to help root weeds out of the row. This makes for 4 - 5 passes after planting, at approximately weekly intervals, for weed control. This type of tillage is shallow and the equipment can cover a lot of acres in a day, especially with the

rotary hoe and early passes of the weeder harrow.

Successful weed control depends on several factors. Watch the field closely, and be prepared to respond as the field (and the weeds) progresses. The easiest weeds to kill are those less than 1 inch tall. Time management is key. Equipment needs to be sized according to the number of acres to be covered. Guidance systems can facilitate faster and more accurate coverage of the field for row cultivation. Plant populations need to be adequate. A common suggestion is to increase seeding rates up to 25% to allow for some plant losses during weed control passes.

A Systems Approach

Organic soybeans can be profitable. You need to be certified organic. Know your market requirements. Plan a good crop rotation for your farm – with good markets for your whole crop rotation. Have flexibility in your cropping program to deal with the conditions of the season.

Brokers and Land Applicators - Certification and Licensing Under the Nutrient Management Act

by Michael Payne, Nutrient Management Specialist, OMAFRA, Stratford

As of December 31, 2005 there are new requirements for Brokers and Land Applicators working with specific agricultural and non-agricultural operations.

"Brokers" are defined as individuals or businesses that transport, haul or store prescribed materials such as manure or biosolids that are intended for land application. "Land applicators" include individuals or businesses that land apply these materials to agricultural land. The following now must be certified and/or licensed by OMAFRA to perform their duties:

- brokers working with agricultural or non-agricultural operations that are required to have a Nutrient Management Strategy (NMS), and
- land application businesses working with agricultural operations that require a Nutrient Management Plan (NMP) under the nutrient management regulation (O. Reg. 267/03) of the *Nutrient Management Act*, 2002 .

Note that this requirement does not apply to septage haulers who only manage hauled sewage unless they land apply treated portable toilet waste.

Agricultural operations that require a NMS include large farms with 300 or more nutrient units and farms with more than five nutrient units that apply for a building permit for livestock housing or a manure storage, or construct an earthen manure storage. Many agricultural operations requiring a NMS also require a NMP. At this point in time, large sewage treatment plants with a design capacity greater than 45,400 m^3/day are the only non-agricultural operations that require a NMS. Other non-agricultural operations will be phased-in over time.

To obtain the **Broker's Certificate** or the **Land Application Business Owner's Licence** candidates must complete the appropriate course and achieve a passing grade on an exam.

To register for a course and/or exam, or of any topic related to nutrient management and requirements under the *Nutrient Management Act*, 2002 and Ontario Regulation 267/03, call the Nutrient Management Toll-Free Information Line at 1-866-242-4460 or refer to the website at www.omafra.gov.on.ca.

Dog Strangling Vine

An invasive species creeping into agricultural fields

by Mike Cowbrough, Weed Management Program Lead, OMAFRA, Guelph

Dog Strangling Vine is an extremely aggressive plant species from the milkweed family that has traditionally inhabited field borders, roadside and rail tracks. More recently it has been creeping into agricultural fields and pasture lands across Ontario, but mainly east of Toronto (see Figure 1). To minimize the impact of Dog Strangling Vine in these areas it is important to understand how this plant reproduces so that control measures are effective as possible.

General Description

Dog Strangling Vine is a perennial with a horizontal woody rootstalk or rhizome (Figure 2). The stems can range in length from 60 to 200 cm (24 – 80 inches) with a twining or scrambling configuration, hence giving it the "strangling" moniker. The leaves are ovate (oval) in shape, have smooth margins, with hairs being present on the margins and major leaf veins on the underside of the leaf (Figure 3). According to DiTommaso et al. 2005, the flowers of Dog Strangling Vine are a pink, red-brown or maroon, while "Black" Dog Strangling Vine has

flowers that are dark purple to blackish. Flowers will produce pods containing seed that is similar in appearance to common milkweed.

General Reproduction and Biology
Dog Strangling Vine can reproduce by seed and by its massive underground root system (rhizomes). The seed is extremely viable once it germinates and the rhizomes can also propagate many new plants. An example of this was illustrated in a growth room experiment conducted at the Department of Plant Agriculture, University of Guelph. Every time a rhizome section was cut, two new plants would arise from each severed end.

In one season the vine has been known to grow as much as 1 to 2 m in size. Flowering generally begins in late-May and ends around mid-July. The fruit pods release seed from mid-August to early-November.

Control Options: Non-Chemical
The following is a summary of non-chemical control strategies that have been tested by Dr. Naomi Cappuccino, an assistant professor in the Department of Biology at Carleton University.

Control Options: Chemical
After a thorough literature search, only one herbicide label (Arsenal) lists Dog Strangling Vine as a species that will be controlled. There are a number of other products that have been tested and the results are shown in Table 2.

Do you have Dog Strangling Vine?
If you are interested in evaluating some of the above control options, please call me at 519-824-4120 ext. 52580.

References:
The Biology of Invasive Alien Plants in Canada. 2. *Cynanchum rossicum* (Kleopow) Borhidi [= *Vincetoxicum rossicum* (Kleopow) Barbar.] and *Cynanchum louiseae* (L.)
Kartesz & Gandhi [= *Vincetoxicum nigrum* (L.) Moench]
Antonio DiTommaso, Frances M. Lawlor, and Stephen J. Darbyshire
Can. J. Plant Sci. 85: 243-263

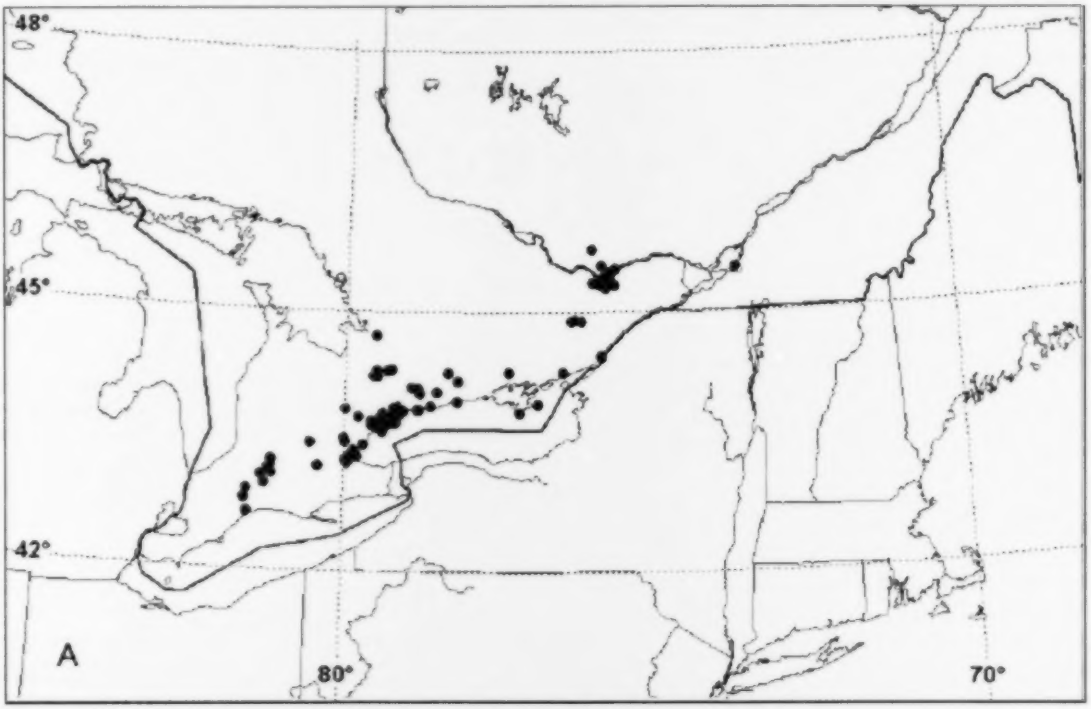
Table 1. Non-chemical control strategies for managing Dog Strangling Vine.

Method	Strategy	Notes
Periodic Mowing	Stops the plants from flowering and thereby reducing seed production.	Doesn't kill the plants as new ones will sprout up from the buds at the base of the stem.
Digging up roots	Remove the entire root of each individual plant.	Effective, but time consuming.
Mowing and Mulching	Mow the plants to stop seed production then cover area with a competitive mulch to stop sprouting of new plants from rhizome	Effective, but unsightly.

Table 2. Notes on Herbicides that have been tested for the control of Dog Strangling Vine.

Product	Comments
Arsenal (imazapyr)	• Dog Strangling Vine listed on label. • Non-Crop Land Herbicide that is non-selective and has residual properties. • Registered for use on "Clearfield" crops in the United States. • Plant-back restrictions for other crops unknown in Ontario.
Garlon 4 (triclopyr - 1% solution)	• Source: http://tncweeds.ucdavis.edu/ • Dog Strangling Vine not listed on product label. • Can be used on grass pasture – re-grazing restrictions exist. • Plant-back restrictions for other crops unknown in Ontario. • U.S. data would suggest that corn, soybeans and wheat could be planted 2 weeks after an application of Garlon 4.
glyphosate	• A lot of variability in results presented in the literature. • Growth room studies showed little activity (U of G, 2005). • Leaf defoliation often observed, but control not achieved. • 2% solutions are often recommended with timings to be made at the flowering stage for the most effective results.
Classic (chlorimuron)	• Growth room studies showed little activity (U of G, 2005)
Dichlorprop/2,4-D	• Growth room studies showed little activity (U of G, 2005)

Figure 1. Distribution of Dog Strangling Vine in Ontario (Source: DiTommaso et al, 2005)



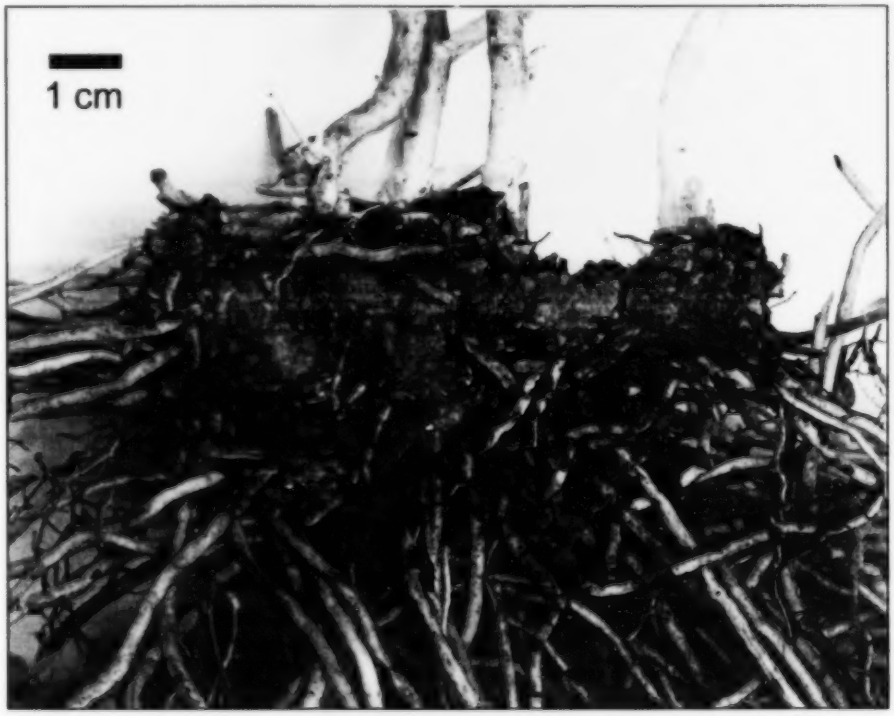


Figure 2. Cross Section through the woody rootstalk of Dog Strangling Vine (Source: DiTommaso et al, 2005)

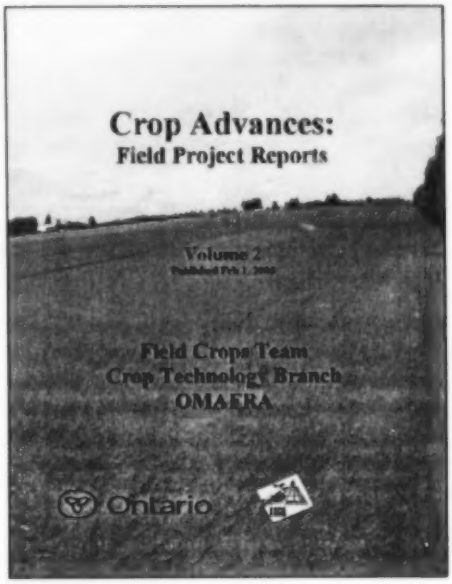
Figure 3. Seedling of Dog Strangling Vine two weeks after emergence in a greenhouse (Source: DiTommaso et al, 2005)

"Crop Advances" Highlights OMAFRA-OSCIA Field Crop Projects

by Ian McDonald, Applied Research Coordinator, OMAFRA, Guelph

"Crop Advances", the new field project report summarizing OMAFRA-OSCIA field trials, was distributed at the recently held OSCIA Annual Meeting. Crop Advances improves the reporting of OSCIA grant projects conducted by the OSCIA and OMAFRA. The information is presented on an individual project basis. This new, stand alone publication gives the projects a greater profile and facilitates promotion. By packaging the projects in a branded way, Crop Advances allows us to explore opportunities by showcasing the results.

Crop Advances can be considered an extension resource. The average producer is not likely to read the entire document. However, OMAFRA staff and OSCIA members will be using this report to write and communicate various extension articles and presentations.



The document has also been made into a CD, and the individual reports are being added to the OSCIA website. The website will highlight to everyone the great work that OSCIA is involved with. It will also provide an archive of the projects for the future.

The current release of Crop Advances is actually Version 2. Version 1 was released in February 2004 by OMAFRA Field Crop staff. That report did not contain all of the OSCIA projects, and was not as widely distributed. However, the enthusiasm generated by this present report and the continued partnering of OSCIA and OMAFRA has been very positive. We will likely continue with this format in the future.

Each local OSCIA association has received a couple of copies of the Crop Advances report in hardcopy. Please speak to your local executive if you want a chance to review the hardcopy version forwarded to them. The information is also being made available on the OSCIA website, along with other information about project grants and previous projects.

For anyone without access to the web, or who would prefer a CD, please contact the OMAFRA Agricultural Contact Centre at 877-424-1300.

Fine Tuning Canola Seeding Rates and Row Widths

by Brian Hall, Canola & Edible Bean Specialist, OMAFRA, Stratford

Achieving target canola seeding rates can be a challenge with some drills. Over-seeding can be a costly mistake, with hybrid seed costing $8 - $10/ lb. One approach that some growers are adopting to improve seeding rate accuracy while saving on seed costs, is switching to planting canola in 14 inch row width.

Potential advantages with this approach include:

- improved calibration of seeding rate,
- reduced seeding rate,
- improved emergence on soils prone to crusting due to higher number of seeds per foot of row,
- opportunity to band starter fertilizer in alternate rows, and
- reduced potential of serious sclerotinia stem rot (white mould) by improved air flow through the canopy.

Ontario research on row widths dates back to the 1970's, when narrow rows significantly outyielded wider row widths. The most recent row width research conducted was in North Dakota, which concluded that there was no yield advantage to narrow (7 inch) over wider row widths.

Georgian Soil & Crop Trial

In 2005, the Georgian Regional Soil & Crop Improvement Association undertook a project to compare seeding hybrid canola in 18 cm (7 inch) vs 36 cm (14 inch) row widths. Seven sites were established, but only 4 were harvested due to the extreme heat and drought stress that impacted emergence, growth and yield. The target seeding rate was 5 lbs/ac in 18 cm (7 inch) rows, and 3.5 lbs in 36 cm (14 inch) rows. Seeding in 36 cm row width was accomplished by blocking off alternate rows on the drill.

Results of the 4 locations harvested are shown in Table 1. Canola in the 36 cm (14 inch) row width, took approximately 5-7 days longer to canopy over than the 18 cm (7 inch) rows. Canola plants displayed more branching in the wider row width. All plots showed considerable moisture stress at flowering, and flower blasting was very evident. Variety varied by location. Except for one site, the seeding rate for 36 cm row width averaged 3.9 lbs/ ac vs. 5.3 lb/ac for 16 cm row width. Final plant population in the 36 cm rows ranged from 45% to 90% of that in the 16 cm row width. Given the reduced canopy in 2005, this may have impacted final yield.

Results from 2005 should not be viewed as a recommendation, with only 1 year of data, but hopefully encourage other growers to conduct a trial on their own farm in 2006.

Table 1 - 2005 Spring Canola Row Width Trial

Row Width	Seeding Rate lbs/ac	Final Population plants/ft^2	Yield lbs/ac
7 inch (18 cm)	5.3	6.3	1775
14 inch (36 cm)	3.9	4.1	1624
Note: average of 4 trials.			